



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

MEMORANDUM

MAR 10 1993

Subject: Copper Compounds Phase IV Review

From: Anthony F. Maciorowski, Chief *Anthony F. Maciorowski* OFFICE OF  
Ecological Effects Branch PREVENTION, PESTICIDES AND  
Environmental Fate and Effects Division (H7507C) TOXIC SUBSTANCES

To: Kathy Davis, Chemical Review Manager  
Special Review and Reregistration Division (H7508W)

The Ecological Effects Branch (EEB) Phase IV review for Copper Compounds (chemical number ~~024002~~, 023104, 025602, 024407, 024403) has been completed. An avian reproduction study on the mallard duck (71-4 (b)) and the Bobwhite quail (71-4 (a)) will be required on all of the copper compounds listed above. However, the avian reproduction studies being conducted for Copper II compounds, copper oxychloride sulfate and copper hydroxide, if acceptable, could be used to fulfill these avian testing requirements (registrants must have permission to use the data for their reregistration needs).

*Franklin acceptable  
per Reregistration  
8/4/93*

The use of Copper Thiocyanate (#025602) and Copper 8-Quinolate (#024002) in antifoulant paints, poses a potential concern to non-target aquatic organisms, with regard to possible persistence and toxicity. However, EEB will not require toxicity studies on these compound at this time until the Environmental Fate and Ground Water Branch (EFGW) has completed their assessment and defined dissociation constants.

Regarding a value added issue, EEB is requesting one of the five 123-2 Aquatic Plant Growth studies on the active ingredient of the listed compounds (#025602, #024002, #023104, #024403, #024407). Although plant studies were not required when the Copper Standard was completed (1989), they are required now, in order to identify aquatic plant toxicity for compounds used as herbicides, algaecides and antifoulants. Since, these chemicals are designed to impact plants, EEB needs information on their No Effect Levels (NOEL) in order to protect non-target plants. The requirement for 123-2 aquatic plant testing has been triggered because of use site and exposure potential listed in the LUIS report. Presently, EEB considers that four of the study requirements, Anabeana spp. (bluegreen algae), Nitzchia palea (diatom), and Selenastrum capricornutum (green algae), provide marginally useful information on the potential toxic effects of copper to aquatic plants and will suffice for reregistration requirements. However, EEB will need new toxicity testing for

*123-2  
all compounds  
for Reregistration  
8/4/93*



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the Lemna valdiviana (duckweed) because the studies submitted to the Agency are not considered suitable for risk assessment. Plant studies (123-1(a), 123-1(b), 123-2) will also be required on the Copper Salts of Fatty and Rosin Acids (#023104) because of aerial application to peanuts (Miachel Rexrode 305-5578).

## Discussion of Available Aquatic Plant Data

All five 123-2 aquatic plant tests are triggered based on use sites and exposure potential. However, the EEB is considering other information to determine which studies are needed and which can be fulfilled with available data.

The document: Guidelines for Surface Water Quality, Volume 1 Inorganic Chemical Substances: Copper, published by Environment Canada, 1981 (copy located in Branch File, 008001) contains information on several aquatic plants.

### Acceptable Data

One of the studies produced an EC50 for the freshwater diatom Nitzchia linearis which would be useful in plant risk assessment.

### Marginally Acceptable Data

Other tests yielded concentrations at which both severe and minimal growth inhibition occurred, but did not provide EC50's. This includes tests with Anabeana spp. (bluegreen algae), Nitzchia palea (diatom), and Selenastrum capricornutum (green algae). These tests could be marginally useful to provide information on the potential effects of copper on algae, but the conclusions of such a risk assessment would be less certain than statistically sound EC50's were used.

The uncertainty would stem from the fact that the level of concern (the concentration at which minimal effects occurred) would not be an EC50 with the associated statistical significance. Using the concentrations at which minimal effects occurred would likely result in an over-estimation of risk. The "value added" for asking that the algae studies be conducted would be medium.

### Data not useful in Risk Assessment

The study with Lemna valdiviana (duckweed) only provided an effect at which severe inhibition and death occurred. This is not considered suitable for risk assessment for aquatic vascular plants. It did not yield a lower level at which minimal effects occurred, so a protective level of concern can not be developed against which to compare aquatic concentrations. Therefore, we recommend that the 14-day duckweed study with Lemna gibba be requested as a condition of reregistration. The registrant should be notified that when conducting the study, the nutrient supplement EDTA should not be used. EDTA will tend to bind with, and reduce the availability of copper and possibly make it seem less toxic to the duckweed that it would be without the EDTA. The "value added" for asking for the duckweed study is high.

The EEB can use the available aquatic plant testing for aquatic plant risk assessment except for the duckweed study.

SUMMARY TABLE OF AVAILABLE AQUATIC PLANT DATA

SPECIES	TEST DURATION	TEST RESULTS	USEFUL IN RISK ASSESSMENT
<u>Nitzchia linearis</u> (diatom)	5-days	EC50=0.795 to 0.815 mg Cu++/L	useful
<u>Anabeana</u> spp. (bluegreen algae)	5-days	0.04 mg Cu++/L inhibited growth, no recovery 0.01 mg Cu++/L growth inhibited slightly	marginally useful
<u>Nitzchia palea</u> (diatom)	not provided	0.001 to 0.002 mg Cu++/L suppressed photosynthesis	marginally useful
<u>Selenastrum capricornutum</u> (green algae)	not provided	0.05 mg Cu++/L inhibited growth slightly 0.09 mg Cu++/L inhibited growth completely	marginally useful
<u>Lemna valdiviana</u> (duckweed)	not provided	0.1 mg Cu++/L caused severe growth inhibition and mortality	not considered scientifically useful for risk assessment

Date: 3/03/93  
Case No: 4026  
Chemical No: 024002

PHASE IV  
DATA REQUIREMENTS FOR  
ECOLOGICAL EFFECTS BRANCH  
COPPER 6-QUINOLATE

Data Requirements	Composition <sup>1</sup>	Use Pattern <sup>2</sup>	Does EPA Have Data To Satisfy This Requirement? (Yes, No)	Bibliographic Citation	Must Additional Data Be Submitted under FIFRA3(c)(2)(B)?
<b>6 Basic Studies in Bold</b>					
<b>71-1(a) Acute Avian Oral, Quail/Duck</b>	TGAI	CKLMO	Y		N
71-1(b) Acute Avian Oral, Quail/Duck	(TEP)	CKLMO	N		N <sup>3</sup>
<b>71-2(a) Acute Avian Diet, Quail</b>	TGAI	CKLMO	Y		N
<b>71-2(b) Acute Avian Diet, Duck</b>	TGAI	CKLMO	Y		N
71-3 Wild Mammal Toxicity					
71-4(a) Avian Reproduction Quail	TGAI	CKLMO	X Y not 8/4/92		
71-4(b) Avian Reproduction Duck	TGAI	CKLMO	X Y		
71-5(a) Simulated Terrestrial Field Study					
71-5(b) Actual Terrestrial Field Study					
<b>72-1(a) Acute Fish Toxicity Bluegill</b>	TGAI	CKLMO	Y		N
72-1(b) Acute Fish Toxicity Bluegill	(TEP)	CKLMO	N		N <sup>3</sup>
<b>72-1(c) Acute Fish Toxicity Rainbow Trout</b>	TGAI	CKLMO	Y		N
72-1(d) Acute Fish Toxicity Rainbow Trout	(TEP)	CKLMO	N		N <sup>3</sup>
<b>72-2(a) Acute Aquatic Invertebrate Toxicity</b>	TGAI	CKLMO	Y		N
72-2(b) Acute Aquatic Invertebrate Toxicity	(TEP)	CKLMO	N		N <sup>3</sup>
72-3(a) Acute Estu/Mari Tox Fish	TGAI	CKLMO	Y		N
72-3(b) Acute Estu/Mari Tox Mollusk	TGAI	CKLMO	Y		N
72-3(c) Acute Estu/Mari Tox Shrimp	TGAI	CKLMO	Y		N

\* In Bibliographic Citation column indicates study may be upgradeable

Date: 3/03/93  
Case No: 4026  
Chemical No: 024002

PHASE IV  
DATA REQUIREMENTS FOR  
ECOLOGICAL EFFECTS BRANCH

Data Requirements	Composition <sup>1</sup>	Use Pattern <sup>2</sup>	Does EPA Have Data To Satisfy This Requirement? (Yes, No)	Bibliographic Citation	Must Additional Data Be Submitted under FIFRA3(c)(2)(B)?
72-3(d) Acute Estu/Mari Tox Fish	(TEP)	CKLMO	N		N <sup>3</sup>
72-3(e) Acute Estu/Mari Tox Mollusk	(TEP)	CKLMO	N		N <sup>3</sup>
72-3(f) Acute Estu/Mari Tox Shrimp	(TEP)	CKLMO	N		N <sup>3</sup>
72-4(a) Early Life-Stage Fish	(TEP)	CKLMO	N		N <sup>3</sup>
72-4(b) Life-Cycle Aquatic Invertebrate	(TEP)	CKLMO	N		N <sup>3</sup>
72-5 Life-Cycle Fish	(TEP)	CKLMO	N		N <sup>3</sup>
72-6 Aquatic Org. Accumulation	(TEP)	CKLMO	N		N <sup>3</sup>
72-7(a) Simulated Aquatic Field Study					
72-7(b) Actual Aquatic Field Study					
122-1(a) Seed Germ./Seedling Emerg.					
122-1(b) Vegetative Vigor					
122-2 Aquatic Plant Growth					
123-1(a) Seed Germ./Seedling Emerg.					
123-1(b) Vegetative Vigor					
123-2 Aquatic Plant Growth	TGAI	CKLMO	N		
124-1 Terrestrial Field Study					
124-2 Aquatic Field Study					
141-1 Honey Bee Acute Contact					
141-2 Honey Bee Residue on Foliage					
141-5 Field Test for Pollinators					

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X<sup>5</sup> Res.

1. Composition: TGAI=Technical grade of the active ingredient; PAIRA=Pure active ingredient, radiolabeled; TEP=Typical end-use product.
2. Use Pattern: A=Terrestrial Food Crop; B=Terrestrial Feed Crop; C=Terrestrial Non-Food Crop; D=Aquatic Food Crop; E=Aquatic Non-Food Outdoor; F=Aquatic Non-Food Industrial; G=Aquatic Non-Food Residential; H=Greenhouse Non-Food Crop; I=Outdoor Residential; J=Indoor Residential; K=Forestry; L=Indoor Non-Food; M=Indoor Medical; N=Indoor Residential; O=Indoor Residential; Z=Use Group for Site 0000.
3. These studies may be required pending the fate assessment by the Environmental Fate and Ground Water Branch (EFGW) for this compound.
4. The avian reproduction studies being conducted for copper oxychloride sulfate and copper hydroxide, if acceptable, could be used to fulfill this requirement if the registrant had permission to use the data for reregistration.
5. Presently, EEB considers that four of the study requirements, Anabaena spp. (bluegreen algae), Nitzschia palea (diatom), and Selenastrum capricornutum (green algae), provide marginally useful information on the potential toxic effects of copper to aquatic plants and will suffice for reregistration requirements. However, EEB will require new toxicity testing on Lemna valdiviana (duckweed) in order to develop a risk assessment.

Date: 3/03/93  
 Case No: 4026  
 Chemical No: 0244403

**PHASE IV  
 DATA REQUIREMENTS FOR  
 ECOLOGICAL EFFECTS BRANCH**

COPPER (TRIETHANOLAMINE COMPLEX)

Data Requirements	Composition <sup>1</sup>	Use Pattern <sup>2</sup>	Does EPA Have Data To Satisfy This Requirement? (Yes, No)	Must Additional Data Be Submitted under FIFRA3(G)(2)(B)?	
				Bibliographic Citation	Bibliographic Citation
<b>6 Basic Studies in Bold</b>					
71-1(a) Acute Avian Oral, Quail/Duck	TGAI	DEFGL	Y		N
71-1(b) Acute Avian Oral, Quail/Duck (TEP)					
71-2(a) Acute Avian Diet, Quail	TGAI	DEFGL	Y		N
71-2(b) Acute Avian Diet, Duck	TGAI	DEFGL	Y		N
71-3 Wild Mammal Toxicity					
71-4(a) Avian Reproduction Quail	TGAI	DEFGL	X Y m r g   4/43		
71-4(b) Avian Reproduction Duck	TGAI	DEFGL	X Y		
71-5(a) Simulated Terrestrial Field Study					
71-5(b) Acute Terrestrial Field Study					
72-1(a) Acute Fish Toxicity Bluegill	TGAI	DEFGL	Y		N
72-1(b) Acute Fish Toxicity Bluegill (TEP)					
72-1(c) Acute Fish Toxicity Rainbow Trout	TGAI	DEFGL			N
72-1(d) Acute Fish Toxicity Rainbow Trout (TEP)					
72-2(a) Acute Aquatic Invertebrate Toxicity	TGAI	DEFGL	Y		N
72-2(b) Acute Aquatic Invertebrate Toxicity (TEP)					
72-3(a) Acute Estu/Mar Tox Fish	TGAI	DEFGL	Y		N
72-3(b) Acute Estu/Mar Tox Mollusk	TGAI	DEFGL	Y		N
72-3(c) Acute Estu/Mar Tox Shrimp	TGAI	DEFGL	Y		N

\* In Bibliographic Citation column indicates study may be upgradeable

Date: 3/03/93		PHASE IV DATA REQUIREMENTS FOR ECOLOGICAL EFFECTS BRANCH		COPPER (TRIETHANOLAMINE COMPLEX)		Must Additional Data Be Submitted under FIFRA3(c)(8)?
Data Requirements		Composition <sup>1</sup>	Use Pattern <sup>2</sup>	Does EPA Have Data To Satisfy This Requirement? (Yes, No)	Bibliographic Citation	
72-3(d) Acute Estu/Mari Tox Fish	(TEP)		DEFGL	N		N
72-3(e) Acute Estu/Mari Tox Mollusk	(TEP)		DEFGL	N		N
72-3(f) Acute Estu/Mari Tox Shrimp	(TEP)		DEFGL	N		N
72-4(a) Early Life-Stage Fish	(TEP)		DEFGL	N		N
72-4(b) Life-Cycle Aquatic Invertebrate	(TEP)		DEFGL	N		N
72-5 Life-Cycle Fish			DEFGL	N		
72-6 Aquatic Org. Accumulation	(TEP)		DEFGL	N		N
72-7(a) Simulated Aquatic Field Study						
72-7(b) Actual Aquatic Field Study						
122-1(s) Seed Germ./Seedling Emerg.						
122-1(b) Vegetative Vigor						
122-2 Aquatic Plant Growth						
123-1(a) Seed Germ./Seedling Emerg.						
123-1(b) Vegetative Vigor						
123-2 Aquatic Plant Growth		TGAI	DEFGL	N		
124-1 Terrestrial Field Study						
124-2 Aquatic Field Study						
141-1 Honey Bee Acute Contact						
141-2 Honey Bee Residue on Foliage						
141-5 Field Test for Pollinators						

*x<sup>6</sup> Res*

1. Composition: TGAI=Technical grade of the active ingredient; PAIRA=Pure active ingredient, radiolabeled; TEP=Typical end-use product.
2. Use Pattern: A=Terrestrial Food Crop; B=Terrestrial Feed Crop; C=Terrestrial Non-Food Crop; D=Aquatic Food Crop; E=Aquatic Non-Food Outdoor; F=Aquatic Non-Food Industrial; G=Aquatic Non-Food Residential; H=Greenhouse Non-Food Crop; J=Forestry; K=Forestry; L=Outdoor Residential; M=Indoor Food; N=Indoor Non-Food; O=Indoor Medical; O=Indoor Residential; Z=Use Group for Site 0000.
3. These studies may be required pending the fate assessment by the Environmental Fate and Ground Water Branch (EFGW) for this compound.
4. The avian reproduction studies being conducted for copper oxychloride sulfate and copper hydroxide, if acceptable, could be used to fulfill this requirement if the registrant had permission to use the data for reregistration.
5. Presently, EEB considers that four of the study requirements, Anabaena spp. (bluegreen algae), Nitzchia palea (diatom), and Scenedesmus capricornutum (green algae), provide marginally useful information on the potential toxic effects of copper to aquatic plants and will suffice for reregistration requirements. However, EEB will require new toxicity testing on Lemna validíviana (duckweed) in order to develop a risk assessment.

Date: 3/03/83		PHASE IV		COPPER (ETHYLENEDIAMINE COMPLEX)	
Case No: 4026		DATA REQUIREMENTS FOR		ECOLOGICAL EFFECTS BRANCH	
Chemical No: 024407		Data Requirements		Composition <sup>1</sup>	Use Pattern <sup>2</sup>
					Does EPA Have Data To Satisfy This Requirement? (Yes, No)
					Must Additional Data Be Submitted under FIFRA3(c)(2)(B)?
<b>6 Basic Studies in Bold</b>					
71-1(a) <b>Acute Avian Oral, Quail/Duck</b>	TGAI	DFG	Y		N
71-1(b) Acute Avian Oral, Quail/Duck	(TEP)				
71-2(a) <b>Acute Avian Diet, Quail</b>	TGAI	DFG	Y		N
71-2(b) <b>Acute Avian Diet, Duck</b>	TGAI	DFG	Y		N
71-3 Wild Mammal Toxicity					
71-4(a) Avian Reproduction Quail	TGAI	DFG	X Y mt 3/4/93		
71-4(b) Avian Reproduction Duck	TGAI	DFG	X Y		
71-5(a) Simulated Terrestrial Field Study					
71-5(b) Actual Terrestrial Field Study					
72-1(a) <b>Acute Fish Toxicity Bluegill</b>	TGAI	DFG	Y		N
72-1(b) Acute Fish Toxicity Bluegill	(TEP)				
72-1(c) <b>Acute Fish Toxicity Rainbow Trout</b>	TGAI	DFG	Y		N
72-1(d) Acute Fish Toxicity Rainbow Trout	(TEP)				
72-2(a) <b>Acute Aquatic Invertebrate Toxicity</b>	TGAI	DFG	Y		N
72-2(b) Acute Aquatic Invertebrate Toxicity	(TEP)				
72-3(a) Acute Estu/Mar Tox Fish	TGAI	DFG	Y		N
72-3(b) Acute Estu/Mar Tox Mollusk	TGAI	DFG	Y		N
72-3(c) Acute Estu/Mar Tox Shrimp	TGAI	DFG	Y		N

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Date: 3/03/93  
Case No: 4026  
Chemical No: 024407

PHASE IV  
DATA REQUIREMENTS FOR  
ECOLOGICAL EFFECTS BRANCH

Data Requirements	Composition <sup>1</sup>	Use Pattern <sup>2</sup>	Does EPA Have Data To Satisfy This Requirement? (Yes, No)	Bibliographic Citation	Must Additional Data Be Submitted under FIFRA3(c)(2)(B)?
72-3(d) Acute Estu/Mari Tox Fish	(TEP)	DFG	N		N
72-3(e) Acute Estu/Mari Tox Mollusk	(TEP)	DFG	N		N
72-3(f) Acute Estu/Mari Tox Shrimp	(TEP)	DFG	N		N
72-4(a) Early Life-Stage Fish	(TEP)	DFG	N		N
72-4(b) Life-Cycle Aquatic Invertebrate	(TEP)	DFG	N		N
72-5 Life-Cycle Fish					
72-6 Aquatic Org. Accumulation	(TEP)	DFG	N		N
72-7(a) Simulated Aquatic Field Study					
72-7(b) Actual Aquatic Field Study					
122-1(a) Seed Germ./Seedling Emerg.					
122-1(b) Vegetative Vigor					
122-2 Aquatic Plant Growth					
123-1(e) Seed Germ./Seedling Emerg.					
123-1(b) Vegetative Vigor					
123-2 Aquatic Plant Growth	TGAI	DFG	N		
124-1 Terrestrial Field Study					
124-2 Aquatic Field Study					
141-1 Honey Bee Acute Contact					
141-2 Honey Bee Residue on Foliage					
141-5 Field Test for Pollinators					

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x Res.

\* In Bibliographic Citation column indicates study may be upgradeable

1. Composition: TGAI=Technical grade of the active ingredient; PAIR=A Pure active ingredient, radiolabeled; TEP=Typical end-use product.
2. Use Pattern: A=Terrestrial Food Crop; B=Terrestrial Feed Crop; C=Terrestrial Non-Food Crop; D=Aquatic Food Crop; E=Aquatic Non-Food Industrial; F=Aquatic Non-Food Outdoor; G=Aquatic Non-Food Industrial; H=Greenhouse Non-Food Residential; I=Forest Residential; J=Forestry; K=Outdoor Residential; L=Indoor Food; M=Indoor Non-Food; N=Indoor Medical; O=Indoor Residential; Z=Use Group for Site 0000.
3. These studies may be required pending the fate assessment by the Environmental Fate and Ground Water Branch (EFGW) for this compound.
4. The avian reproduction studies being conducted for copper oxychloride sulfate and copper hydroxide, if acceptable, could be used to fulfill this requirement if the registrant had permission to use the data for reregistration.
5. Presently, EEB considers that four of the study requirements, Anabaena spp. (bluegreen algae), Nitzchia palea (diatom), and Selenastrum capricornutum (green algae), provide marginally useful information on the potential toxic effects of copper to aquatic plants and will suffice for reregistration requirements. However, EEB will require new toxicity testing on Lemna validiriana (duckweed) in order to develop a risk assessment.

Date: 3/03/93  
Case No: 4026  
Chemical No: 023104

**PHASE IV  
DATA REQUIREMENTS FOR  
ECOLOGICAL EFFECTS BRANCH**

**COPPER Salts of Fatty and Rosin Acids**

Data Requirements	Composition <sup>1</sup>	Use Pattern <sup>2</sup>	Does EPA Have Data To Satisfy This Requirement? (Yes, No)	Bibliographic Citation	Must Additional Data Be Submitted under CERCLA(c)(2)(B)?
<b>6 Basic Studies in Bold</b>					
<b>71-1(a) Acute Avian Oral, Quail/Duck</b>	TGAI	ABCHF	Y		N
71-1(b) Acute Avian Oral, Quail/Duck	(TEP)				
<b>71-2(a) Acute Avian Diet, Quail</b>	TGAI	ABCHF	Y		N
<b>71-2(b) Acute Avian Diet, Duck</b>	TGAI	ABCHF	Y		N
<b>71-3 Wild Mammal Toxicity</b>					
<b>71-4(a) Avian Reproduction Quail</b>	TGAI	ABCHF	X		
<b>71-4(b) Avian Reproduction Duck</b>	TGAI	ABCHF	X		
<b>71-5(a) Simulated Terrestrial Field Study</b>					
<b>71-5(b) Actual Terrestrial Field Study</b>					
<b>72-1(a) Acute Fish Toxicity Bluegill</b>	TGAI	ABCHF	Y		N
<b>72-1(b) Acute Fish Toxicity Bluegill</b>	(TEP)				
<b>72-1(c) Acute Fish Toxicity Rainbow Trout</b>	TGAI	ABCHF	Y		N
<b>72-1(d) Acute Fish Toxicity Rainbow Trout</b>	(TEP)				
<b>72-2(a) Acute Aquatic Invertebrate Toxicity</b>	TGAI	ABCHF	Y		N
<b>72-2(b) Acute Aquatic Invertebrate Toxicity</b>	(TEP)				
<b>72-3(a) Acute Estu/Mari Tox Fish</b>	TGAI	ABCHF	Y		N
<b>72-3(b) Acute Estu/Mari Tox Mollusk</b>	TGAI	ABCHF	Y		N
<b>72-3(c) Acute Estu/Mari Tox Shrimp</b>	TGAI	ABCHF	Y		N

Date: 3/03/93  
Case No: 4026  
Chemical No: 023104

PHASE IV  
DATA REQUIREMENTS FOR  
ECOLOGICAL EFFECTS BRANCH

Data Requirements	Composition <sup>1</sup>	Use Pattern <sup>2</sup>	Does EPA Have Data To Satisfy This Requirement? (Yes, No)	Bibliographic Citation	Must Additional Data Be Submitted under FIFRA3(c)(2)(B)?
72-3(d) Acute Estu/Mari Tox Fish	(TEP)	ABCHF	N		N
72-3(e) Acute Estu/Mari Tox Mollusk	(TEP)	ABCHF	N		N
72-3(f) Acute Estu/Mari Tox Shrimp	(TEP)	ABCHF	N		N
72-4(a) Early Life-Stage Fish	(TEP)	ABCHF	N		N
72-4(b) Life-Cycle Aquatic Invertebrate	(TEP)	ABCHF	N		N
72-5 Life-Cycle Fish					
72-6 Aquatic Org. Accumulation	(TEP)	ABCHF	N		
72-7(a) Simulated Aquatic Field Study					
72-7(b) Actual Aquatic Field Study					
122-1(a) Seed Germ./Seedling Emerg.					
122-1(b) Vegetative Vigor					
122-2 Aquatic Plant Growth					
123-1(a) Seed Germ./Seedling Emerg.	TGAI	ABCHF	N		Y
123-1(b) Vegetative Vigor	TGAI	ABCHF	N		Y
123-2 Aquatic Plant Growth	TGAI	ABCHF	N		<i>✓<sup>6</sup> Res.</i>
124-1 Terrestrial Field Study					
124-2 Aquatic Field Study					
141-1 Honey Bee Acute Contact					
141-2 Honey Bee Residue on Foliage					
141-5 Field Test for Pollinators					

\* In Bibliographic Citation column indicates study may be upgradeable

1. Composition: TGAI=Technical grade of the active ingredient; PAIRA=Pure active ingredient, radiolabeled; TEP=Typical end-use product.
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Date: 3/03/93 Case No.: 4026 Chemical Nc: 025602

**PHASE IV  
DATA REQUIREMENTS FOR  
ECOLOGICAL EFFECTS BRANCH**

Data Requirements	Composition <sup>1</sup>	Use Pattern <sup>2</sup>	Does EPA Have Data To Satisfy This Requirement? (Yes, No)	Bibliographic Citation	Must Additional Data Be Submitted under FIFRA3(c)(2)(B)?
<b>6 Basic Studies in Bold</b>					
71-1(a) Acute Avian Oral, Quail/Duck	TGAI (TEP)	E	Y		N
71-1(b) Acute Avian Oral, Quail/Duck	TGAI (TEP)	E	N		N <sup>3</sup>
71-2(a) Acute Avian Diet, Quail	TGAI	E	Y		N
71-2(b) Acute Avian Diet, Duck	TGAI	E	Y		N
71-3 Wild Mammal Toxicity				X Y W <sup>4</sup>	
71-4(a) Avian Reproduction Quail	TGAI	E		X Y	
71-4(b) Avian Reproduction Duck	TGAI	E			
71-5(a) Simulated Terrestrial Field Study					
71-5(b) Actual Terrestrial Field Study					
72-1(a) Acute Fish Toxicity Bluegill	TGAI (TEP)	E	Y		N
72-1(b) Acute Fish Toxicity Bluegill	TGAI (TEP)	E	N		N <sup>3</sup>
72-1(c) Acute Fish Toxicity Rainbow Trout	TGAI (TEP)	E	Y		N
72-1(d) Acute Fish Toxicity Rainbow Trout	TGAI (TEP)	E	N		N <sup>3</sup>
72-2(a) Acute Aquatic Invertebrate Toxicity	TGAI (TEP)	E	Y		N
72-2(b) Acute Aquatic Invertebrate Toxicity	TGAI (TEP)	E	N		N <sup>3</sup>
72-3(a) Acute Estu/Mar Tox Fish	TGAI	E	Y		N
72-3(b) Acute Estu/Mar Tox Mollusk	TGAI	E	Y		N
72-3(c) Acute Estu/Mar Tox Shrimp	TGAI	E	Y		

Data Requirements	PHASE IV DATA REQUIREMENTS FOR ECOLOGICAL EFFECTS BRANCH		COPPER THIOCYANATE		Must Additional Data Be Submitted under FIFRA3(c)(2)(B)?
	Composition <sup>1</sup>	Use Pattern <sup>2</sup>	Does EPA Have Data To Satisfy This Requirement? (Yes, No)	Bibliographic Citation	
72-3(d) Acute Estu/Mari Tox Fish	(TEP)	E	N		N <sup>3</sup>
72-3(e) Acute Estu/Mari Tox Mollusk	(TEP)	E	N		N <sup>3</sup>
72-3(f) Acute Estu/Mari Tox Shrimp	(TEP)	E	N		N <sup>3</sup>
72-4(a) Early Life-Stage Fish	(TEP)	E	N		N <sup>3</sup>
72-4(b) Life-Cycle Aquatic Invertebrate	(TEP)	E	N		N <sup>3</sup>
72-5 Life-Cycle Fish					
72-6 Aquatic Org. Accumulation	(TEP)	E			N3
72-7(a) Simulated Aquatic Field Study					
72-7(b) Actual Aquatic Field Study					
122-1(a) Seed Germ./Seedling Emerg.					
122-1(b) Vegetative Vigor					
122-2 Aquatic Plant Growth					
123-1(a) Seed Germ./Seedling Emerg.					
123-1(b) Vegetative Vigor					
123-2 Aquatic Plant Growth	TGAI	E			
124-1 Terrestrial Field Study					
124-2 Aquatic Field Study					
141-1 Honey Bee Acute Contact					
141-2 Honey Bee Residue on Foliage					
141-5 Field Test for Pollinators					

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\* In Bibliographic Citation column indicates study may be upgradeable

1. Composition: TGAI=Technical grade of the active ingredient; PAIRA=Pure active ingredient, radiolabeled; TEP=Typical end-use product.
2. Use Pattern: A=Terrestrial Food Crop; B=Terrestrial Feed Crop; C=Terrestrial Non-Food Crop; D=Aquatic Food Crop; E=Aquatic Non-Food Outdoor; F=Aquatic Non-Food Industrial; G=Aquatic Non-Food Residential; H=Greenhouse Non-Food Crop; I=Outdoor Residential; J=Forestry; K=Outdoor Non-Food; M=Indoor Food; N=Indoor Medical; O=Indoor Residential; Z=Use Group for Site 0000.
3. These studies may be required pending the fate assessment by the Environmental Fate and Ground Water Branch (EFGW) for this compound.
4. The avian reproduction studies being conducted for copper oxychloride sulfate and copper hydroxide, if acceptable, could be used to fulfill this requirement if the registrant had permission to use the data for reregistration.
5. Presently, EEB considers that four of the study requirements, Anabaena spp. (bluegreen algae), Nitzchia palea, and Selenastrum capricornutum (green algae), provide marginally useful information on the potential toxic effects of copper to aquatic plants and will suffice for reregistration requirements. However, EEB will require new toxicity testing on Lemna validiana (duckweed) in order to develop a risk assessment.